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**Improvements to pistons for thermal engines, in particular two-stroke engines**

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*(Patent Application, grant of which was deferred in accordance with Article 11, § 7, of the law of 5<sup>th</sup> July 1844 amended by the law of 7<sup>th</sup> April 1902.)*

The invention relates to pistons for thermal engines, in particular two-stroke engines, of all types: explosion engines and combustion engines, opposed- or non-opposed piston engines etc.

5 It is known that two-stroke engines have the serious disadvantage of consuming excessive quantities of lubricating oil, said quantities being much greater than those consumed by four-stroke engines. Attempts have been made to reduce this excessive oil consumption, but these have achieved only an insufficient reduction.

The object of the invention is to eliminate this excessive oil consumption.

10 The applicant has noted that this excessive consumption is caused primarily by the oil leaks around the ends of the connecting rod/piston pin bearings: these ends, which have necessarily to be abundantly lubricated, are situated in the immediate vicinity of the piston rings, in an area subject to considerable cyclical variations in pressure, which draw up the oil from the connecting rod/piston pin bearings by acting  
15 in the manner of a pump.

According to the invention, the piston, which is otherwise normal and optionally provided with known auxiliary arrangements, is surrounded, over its entire height below the rings, with a skirt, of generally cylindrical appearance, fixed by screws to the piston body and precisely sealing the passages perpendicular to the  
20 connecting rod/piston pin; preferably, said skirt is made of the same metal as the piston body, or at the very least of a metal having the same coefficient of thermal expansion as the piston body; preferably also, the bottom of said skirt is arranged to receive one or more rings providing guidance in the cylinder.

25 The applicant has noted that, with said skirt according to the invention, the excessive oil consumption is radically reduced and the oil consumption of a two-stroke engine thus equipped becomes comparable to that of a four-stroke engine.

The invention will be described with reference to Figures 1 and 2, given by way of non-limiting example, which relate to a two-part piston for an opposed-piston combustion engine:

Figure 1 is an end view, from the crankshaft end, of the skirt according to the invention;

Figure 2 is an axial section of the piston taken parallel to the crankshaft, along line II-II of Figure 1, showing the piston with the skirt according to the invention.

The piston itself is of known type and consists of two parts, a body 1 and a head 2; the body 1 is of a light alloy and comprises the receptacle 3, connecting rod/piston pin bearings (not shown), receptacles 4 for conventional rings (not shown) and a cooling oil circuit (not shown) in the chamber 6; said chamber is cast and is closed by a filter disc 7; the head 2 is of high-strength steel and is screwed at 8 and bolted at 9 onto the body 1, with the interposition of an air space 10 providing thermal insulation by means of a steel ring 11; in the head 2 there are formed the combustion semi-chamber 12 and the injected fuel semi-passage 13.

According to the invention, the piston body 1 is provided with a skirt 20, generally cylindrical in form, of the same light alloy as the body 1; the skirt 20 completely surrounds the body 1 over its entire height below the rings 4; the skirt 20 is accommodated in a narrowed portion 21 of the body 1 and exhibits externally substantially the same diameter as the non-narrowed portion of the body 1; at the ring 4 end, the skirt 20 abuts at 22 against the end of the narrowed portion 21 and, at the opposite end, it is held by four stud bolts 23, screwed into four pillars 24 of the body 1 and extending into drillholes 25 in shoulders 26 of the skirt 20, with pinned nuts 27. Preferably, the skirt 20 is provided, for example, with two grooves 28 accommodating piston guide rings (not shown); the excess thickness 29 required for these receptacles 28 is accommodated in another narrowed portion 30 of the body 1.

The simplicity, and consequently the economy of the means used in the invention will be noted.

The skirt described above with regard to a two-part piston for an opposed-piston combustion engine applies just as well to any other type of piston, for any type of thermal engine, if suitably adapted by the person skilled in the art.

## SUMMARY STATEMENT

The invention relates to:

1. A piston for a thermal engine, in particular a two-stroke engine, characterised in that the piston is provided with a skirt, of generally cylindrical appearance, surrounding it over its entire height below the rings and precisely sealing the passages perpendicular to the connecting rod/piston pin, said skirt being made of the same metal as the piston or of a metal having the same coefficient of thermal expansion;
2. A piston according to 1, and according to the following arrangements, taken separately or in any combination:
  - a. the skirt is accommodated in a narrowed portion of the piston and exhibits externally substantially the same diameter as the non-narrowed portion of the piston,
  - b. the bottom of the skirt is provided with one or more guide rings, for example two rings, and the corresponding excess thickness of the skirt is accommodated in another narrowed portion of the piston,

c. the skirt is fixed on the piston, at the crankshaft end, by four screws or stud bolts, screwed into pillars of the piston, passing through shoulders of the skirt, with pinned nuts.